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| APPLICATION NO.     | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---------------------|-------------|----------------------|---------------------|------------------|
| 10/579,250          | 05/12/2006  | Hee-Joo Jeon         | NEK-0031            | 7111             |
| 23413               | 7590        | 02/20/2009           | EXAMINER            |                  |
| CANTOR COLBURN, LLP |             |                      | CHEUNG, WILLIAM K   |                  |
| 20 Church Street    |             |                      | ART UNIT            | PAPER NUMBER     |
| 22nd Floor          |             |                      | 1796                |                  |
| Hartford, CT 06103  |             |                      |                     |                  |
| NOTIFICATION DATE   |             | DELIVERY MODE        |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

[usptopatentmail@cantorcolburn.com](mailto:usptopatentmail@cantorcolburn.com)

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/579,250             | JEON ET AL.         |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | WILLIAM K. CHEUNG      | 1796                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 1/5/09.  
 2a) This action is **FINAL**.                  2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-6,8-14 and 16-26 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-6,8-14 and 16-25 is/are rejected.  
 7) Claim(s) 26 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
     1. Certified copies of the priority documents have been received.  
     2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____.   | 6) <input type="checkbox"/> Other: _____ .                        |

## **DETAILED ACTION**

1. In view of the amendment filed January 5, 2009, claims 7, 15 have been cancelled. Claims 1-6, 8-14, 16-26 are pending.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tachibana et al. (US 4,035,563) as evident by Glosesener et al. (US 5,214,092) in view of the product literature of Fujian Sannong Calcium Carbonate Co., on Nano calcium carbonate (1993), further in view of Polanco et al. (US 2003/0203695 A1) for the reasons adequately set forth from paragraph 6 of the office action of October 3, 2008.

1. (Currently Amended) A nano calcium carbonate/vinyl chloride monomer dispersion composition comprising:

a vinyl chloride monomer;

nano calcium carbonate; and

a lipophilic dispersing agent, which comprises 1-30 parts by weight of nano calcium carbonate per 100 parts by weight of the vinyl chloride monomer,

wherein the nano calcium carbonate is dispersed in the vinyl chloride and the surface of nano calcium carbonate is modified by being treated with a metal salt of an organic acid; and

wherein the lipophilic dispersing agent has a homopolymer selected from the group consisting of polyolefin, polyether, polymethacrylate, polyacrylate, polyacetate, polyester and polyurethane or a copolymer thereof as a main chain, and at its side chain, the lipophilic dispersing agent has a functional group of phosphoric acid, carboxylic acid or its salt or ester so that it is chemically compatible with the modified surface of the nano calcium carbonate.

Tachibana et al. (col. 5, line 15-47) disclose a process for preparing a dispersion composition comprising adding a water soluble metallic salt, which include calcium carbonate as a water soluble metallic salt. Although Tachibana et al. disclose that amount of calcium carbonate used is 100 ppm to water, when the such concentration of calcium carbonate solution is added to the vinyl chloride monomers with other ingredients such as methanol, initiator (col. 1, line 12) and suspension stabilizer (col. 1, line 12), which would lower the solubility characteristics of calcium carbonate in water, causing the calcium carbonate to precipitate. As evident in Glosesener et al. (col. 2, line 67 to col. 3, line 2), the precipitation of calcium carbonate is an easy method for making nano-size particles of calcium carbonate. In view of the evidence of Glosesener et al., the examiner has a reasonable basis to believe that the process of Tachibana et al. also involve the precipitation of the calcium carbonate while preparing a mixtures comprising vinyl chloride monomers in the presence of lipophilic dispersing agents. Since the PTO does not have proper means to conduct experiments, the burden of proof is now shifted

to applicants to show otherwise. In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977); In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

Regarding the claimed lipophilic dispersion agents, Tachibana et al. (col. 1, line 12) clearly disclose the use of suspension stabilizer as well as initiator. Tachibana et al. (col. 8, claim 5) disclose the use of partially saponified polyvinyl alcohol (or polyvinyl acetate), cellulose, gelatin, and tricalcium phosphate. Tachibana et al. (col. 5, line 20-35) clearly disclose a composition comprising polyvinylacetate, which meet the homopolymer component of claim 1.

The difference between the invention of claims 1-6, 8 and Tachibana et al. is that Tachibana et al. are silent on a composition comprising 1-30 parts by weight of nano calcium carbonate per 100 parts by weight of vinyl chloride monomer.

However, the product literature of Fujian Sannong Calcium Carbonate Co., on Nano calcium carbonate (1993) teaches that nano calcium carbonates are suitable as filler for polyvinyl chloride polymers. Therefore, motivated by the expectation of success of obtaining a polyvinyl chloride filled with nano calcium carbonate for PVC cable applications, which are products formed by extrusion processes, it would have been obvious to one of ordinary skill in art to incorporate the filler teachings and the extrusion teachings of the product literature of Fujian Sannong Calcium Carbonate Co., into Tachibana et al. to obtain the invention of claims 1-6, 8.

The further difference between the invention of claims 1-6, 8 and Tachibana et al. /Fujian Sannong Calcium Carbonate Co. is that the Fujian Sannong Calcium Carbonate

Co. is silent that the surface on the nano calcium carbonate has been modified with an organic acid.

However, Polanco et al. (page 2, 0021) disclose that it is beneficial to modify calcium carbonate fillers with a fatty acid such as stearic acid to facilitate the free flow of the particles and their ease of dispersion into the polymer matrix. Motivated by the expectation of success of improving the ease of dispersion into the polymer matrix, it would have been obvious to one of ordinary skill in art to modify calcium carbonate fillers with a fatty organic acid to obtain the invention of claims 1-6, 8.

Applicant's arguments filed January 5, 2009 have been fully considered but they are not persuasive. Applicants argue that Tachibana et al. do not teach a process comprising the homopolymers recited in claim 1. However, the examiner disagrees because Tachibana et al. (col. 5, line 20-35) clearly disclose a composition comprising polyvinylacetate, which meet the homopolymer component of claim 1. Applicants must recognize that the invention as claimed is related to a nano calcium carbonate/vinyl chloride monomer dispersion composition, not related to the process of making the same. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

4. Claims 1-6, 8-14, 16-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tachibana et al. (US 4,035,563) as evident by Glosesener et al. (US 5,214,092) in view of the product literature of Fujian Sannong Calcium Carbonate Co., on Nano calcium carbonate (1993), in view of Polanco et al. (US 2003/0203695 A1), in view of Mathur et al. (US 4,980,395) as evident by Detterman (US 5,912,277), and further in view of Detterman (US 5,912,277) for the reasons adequately set forth from paragraph 7 of the office action of October 3, 2008.

9. (Currently Amended) A method for preparing a PVC based nanocomposite resin composition comprising the steps of:

(a) adding nano calcium carbonate and a lipophilic dispersing agent to a vinyl chloride monomer to disperse them,

wherein the nano calcium carbonate is dispersed in the vinyl chloride and the surface of nano calcium carbonate is modified by being treated with a metal salt of an organic carboxylic acid, and wherein the lipophilic dispersing agent has a homopolymer selected from the group consisting of polyolefin, polyether, polymethacrylate, polyacrylate, polyacetate, polyester and polyurethane or a copolymer thereof as a main chain, and at its side chain, the lipophilic dispersing agent has a functional group of phosphoric acid, carboxylic acid or its salt or ester so that it is chemically compatible with the modified surface of the nano calcium carbonate;

(b) adding the resultant mixture system to an aqueous solution system comprising deionized water, a suspension stabilizer and a polymerization initiator to prepare a suspension system and polymerizing the suspension system at an elevated temperature to prepare a PVC based nanocomposite resin composition; and

(c) processing the PVC based nanocomposite resin composition including an impact modifier to produce extruded articles.

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18. (Currently Amended) A method for preparing a PVC based nanocomposite resin composition comprising the steps of:

(a) adding nano calcium carbonate, a lipophilic dispersing agent and a polymerization initiator to a vinyl chloride monomer to disperse them,

wherein the nano calcium carbonate is dispersed in the vinyl chloride and the surface of nano calcium carbonate is modified by being treated with a metal salt of an organic carboxylic acid, and wherein the lipophilic dispersing agent has a homopolymer selected from the group consisting of polyolefin, polycether, polymethacrylate, polyacrylate, polyacetate, polyester and polyurethane or a copolymer thereof as a main chain, and at its side chain, the lipophilic dispersing agent has a functional group of phosphoric acid, carboxylic acid or its salt or ester so that it is chemically compatible with the modified surface of the nano calcium carbonate;

(b) adding the resultant mixture system to an aqueous solution system comprising deionized water and a suspension stabilizer to prepare a suspension system and performing polymerization at an elevated temperature to prepare a PVC based nanocomposite resin composition; and

(c) processing the PVC based nanocomposite resin composition including an impact modifier to produce extruded articles.

In view of paragraph 3 of instant office action, the invention of claims 1-6, 8-14, 16-25 is very similar to the process for making the PVC composition as taught in Tachibana et al.

The difference between the invention of claims 10, 19 and Tachibana et al. is that Tachibana et al. do not teach a PVC composition that has been toughened with MBS.

Mathur et al. (col. 7, line 19, KM-680) disclose that impact modifiers for improving the impact properties of the PVC composition are MBS based polymers. As evident by Detterman (col. 8, line 15-31), KM-680 is a MBS based impact modifier. Therefore, motivated by the expectation of success of obtaining a PVC/calcium carbonate nanoparticles composition with improved impact properties, it would have been obvious to

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one of ordinary skill in art to incorporate the MBS teachings of Mathur et al. into Tachibana et al. to obtain the MBS features of claims 10, 19.

Further, the difference between the invention of claims 1-6, 8-14, 16-25 and Tachibana et al. is that Tachibana et al. do not teach calcium carbonate particles that have been modified with a metal salt of an organic acid.

Mathur et al. (abstract) disclose a PVC composition comprising modifying the PVC resins to improve impact strength. Mathur et al. (col. 7, line 23-24) disclose that the PVC compositions comprises calcium carbonate particles that have been surface modified with sodium stearate, a metal salt of an organic acid. Motivated by the expectation of success of obtaining a PVC/calcium carbonate composition with improved impact properties (col. 3, line 49-57), it would have been obvious to one of ordinary skill in art to incorporate the sodium stearate modified calcium carbonate particle teachings of Mathur et al. into Tachibana et al. to obtain the invention of claims 1-6, 8-14, 16-25.

The difference between the invention of claim 13 and Tachibana et al. is that Tachibana et al. do not teach a polyolefin having the molecular weight range as claimed.

Detter et al. (col. 10, line 19-33) disclose the use of chlorinated polyethylene (homopolyolefin) having a weight molecular weight range from 70,000 to 96,000 and a number average molecular weight ranges from 18,000 to 24,000, can be incorporated into the composition disclosed. In view of the substantially identical endeavor in the PVC compounding with processing aids (col. 7, line 36 to col. 8, line 31), it would have

been obvious to one of ordinary skill in art to incorporate the homopolyolefin (CPE) as taught in Detter et al. into Tachibana et al. to obtain the invention of claim 13.

Applicant's arguments filed January 5, 2009 have been fully considered but they are not persuasive.

Applicants argue that Tachibana et al. do not teach a process comprising the homopolymers recited in claim 1. However, the examiner disagrees because Tachibana et al. (col. 5, line 20-35) clearly disclose a composition comprising polyvinylacetate, which meet the homopolymer component of claim 1. Applicants must recognize that the invention as claimed is related to a nono calcium carbonate/vinyl chloride monomer dispersion composition, not related to the process of making the same. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding the process inventions of claims 9-14, 16-25, applicants must recognize that the composition teachings in Tachibana et al. (abstract) also encompass the process of making the same, where the ingredients are added and mixed in order to prepare the disclosed suspension.

***Allowable Subject Matter***

5. Claim 26 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The closest prior art to Tachibana et al. does not disclose the suspension stabilizer as claimed.

26. (Original) The method of claim 18, wherein the suspension stabilizer comprises: a primary suspension stabilizer comprising a polyvinyl acetate having a degree of polymerization of 500-3,000 and a modified cellulose having a degree of substitution of 1.0-3.0 and a degree of polymerization of 50-2,000, which has been hydrolyzed to 70-98 mol%; a secondary suspension stabilizer comprising a polyvinyl acetate having a degree of polymerization of 500-3,000, which has been hydrolyzed to 10-60 mol%.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William K. Cheung whose telephone number is (571) 272-1097. The examiner can normally be reached on Monday-Friday 9:00AM to 2:00PM; 4:00PM to 8:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David WU can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/William K Cheung/  
Primary Examiner, Art Unit 1796

William K. Cheung, Ph. D.  
Primary Examiner  
February 11, 2009

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